Middle School Mathematics

Academic content standard(s)

By the end of grade 8 students will:

Determine, through investigation using a variety of tools and strategies, the relationship between the area of the base and height of a cylinder, and volume of a cylinder, and generalize and develop the formula

Common Core State Standards (CCSS)

Geometry 7.G	Draw, construct, and describe geometrical figures and describe the relationships between them.
7.G.4	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
Grade 8. G.9	Know the formulas for the volume of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Big Idea

Geometry: Spatial sense and geometric relationships are a means to solve mathematical problems in many situations, and help us make sense of a wide variety of natural phenomenon.

Measurement: Measurement is a tool that we can use to describe, compare and make sense of the world. Everyday objects have a variety of attributes, each of which can be measured in different ways.

Learning Goals	**Success Criteria**
Students will: • Identify and measure the height of a cylinder • Identify the base of a cylinder and its area • Explain, using mathematical language, how the height and the volume of a cylinder are connected • Generalize, algebraically, how to find the volume of a cylinder (Volume = area of the base times height or $V = \pi r^2 h$).	**I can:** • Identify the correct heights of a variety of cylinders • Make accurate linear measurements using a variety of units • Select appropriate mathematical language (e.g., 2-dimensional shape and 3-dimensional figure) • Use drawings and labels to support explanations

Misconceptions students are likely to have about this topic

- If the cylinder is lying on its side, students sometimes misread the height as the vertical distance, which would actually be the diameter in this orientation, when height is actually the distance between the two circular bases
- You cannot measure the volume of some objects because they do not have "regular" lengths, widths, or heights
- Confusing "lateral surface area" with "total surface area"

Considerations for Diverse Learners

If using feet, inches, yard, consider that it may be an ELL's first exposure to those units. A student may come from a system where decimals and commas are reversed in usage. Language proficiency levels are still vital to planning instruction in mathematics. Some ELLs arrive with math knowledge that far exceeds US age peers although they may not have enough English to adequately demonstrate that high level of mathematical understanding.

Success criteria is pretty black and white/concrete so this will be easier for many students.

Misconceptions or challenges: Students may not have been exposed to universal measurement